

INTRODUCTION

The area described in this report includes about 396 square miles in south-central New Hampshire, nearly all of which is in the drainage basin of the Merrimack River (see location map).

TEMPERATURE

The mean annual temperature at Nashua is 47°F., and the monthly mean temperature ranges from 22.2° in January to 70.8° in July (see monthly temperature graph).

During the winter months frozen ground impedes the movement of water downward through the soil and is therefore an important factor in determining the ground-water recharge regimen. Normally the ground freezes late in November and remains frozen in part until March. The thickness of the frozen layer varies from about one-half to five or more feet depending on the topographic setting, vegetation and snow cover, climatic conditions, the type of material, and soil-moisture condition. Where the snow accumulates to a thickness of two feet or more, especially under forest cover, the frozen layer may thin and even disappear entirely under the snow.

PRECIPITATION

Normal annual precipitation is 40.3 inches at Nashua and averages about 41 inches for the entire area. It is distributed rather evenly throughout the year (see precipitation graph), but during the winter and early spring much of it falls as snow and remains in storage on the land surface until released by thaws.

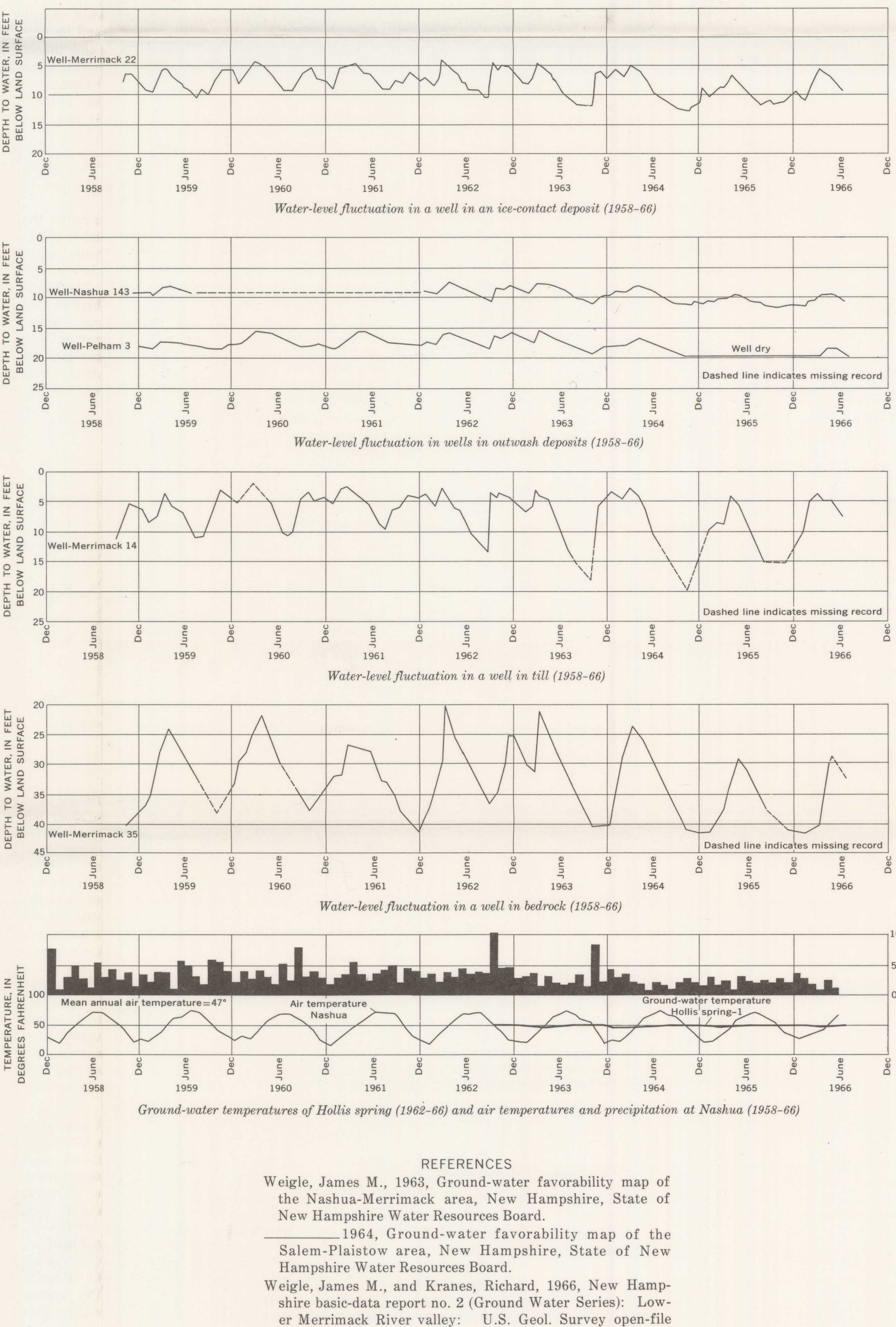
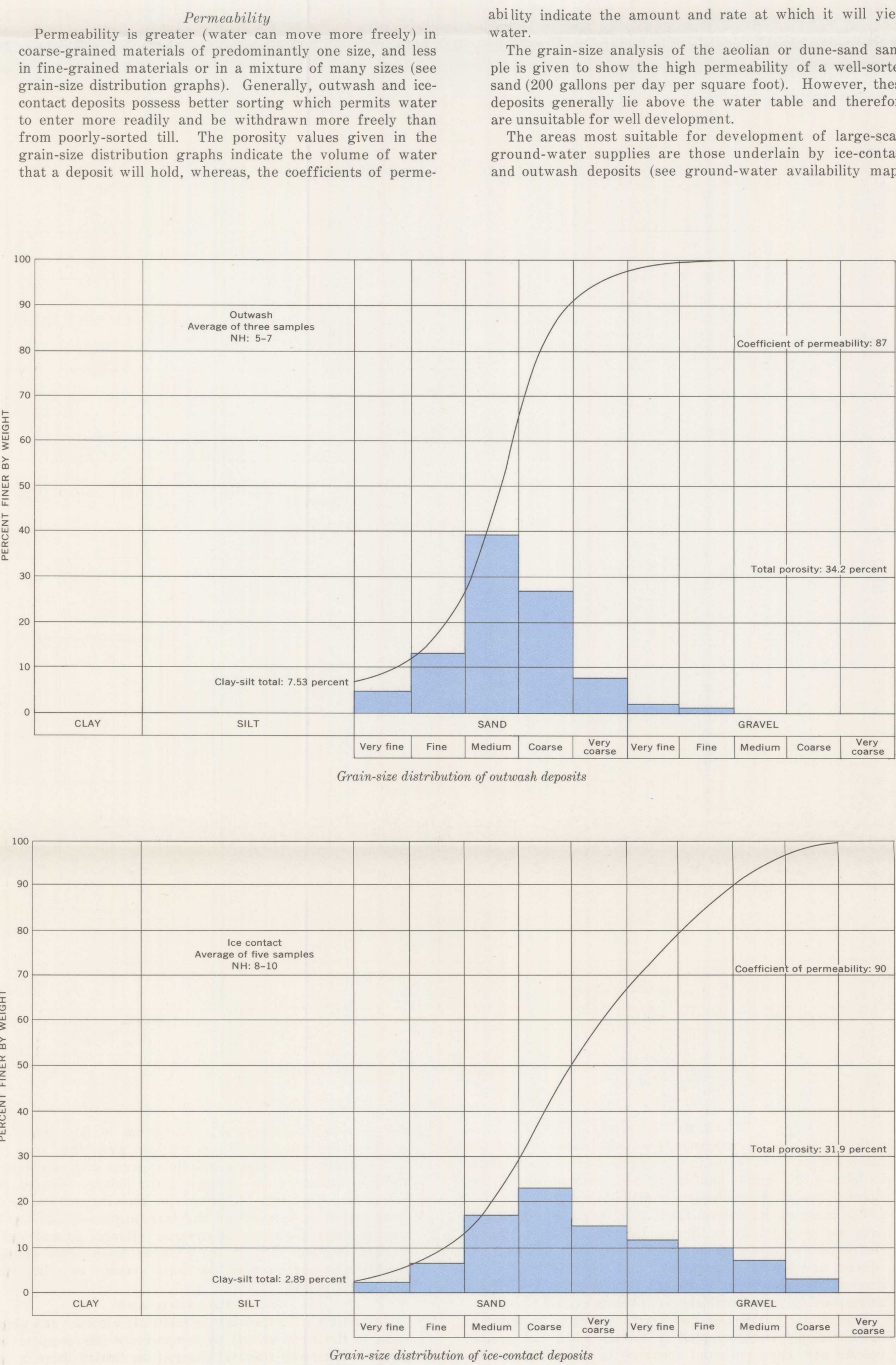
More than half the 41 inches of annual precipitation evaporates directly from the land surface or is transpired by

vegetation. The remainder (about 19 inches) travels rapidly over the land surface into the Merrimack River and its tributaries or percolates down to the water table and thence moves laterally to the streams. The part that reaches the water table and subsequently discharges into the streams is estimated to be about 8 inches per year—an average ground-water discharge of 0.4 mgd (million gallons per day) per square mile of drainage basin.

GROUND WATER

Bedrock and glacial till are sources of small or limited supplies of ground water almost everywhere in the area, but stratified glacial drift (ice-contact and outwash deposits) is a much more favorable source of larger supplies (see ground-water availability map). The most favorable areas for development of substantial large-scale ground-water supplies are those underlain by relatively thick ice-contact or outwash deposits, especially those adjacent to streams or large bodies of surface water from which flow can be induced to replace water withdrawn from the deposits. These deposits generally are less than 50 feet thick in the lower Merrimack River valley, but in some places may be more than 100 feet thick. Where saturated, these deposits are ground-water reservoirs storing about one and one-half billion gallons of water per square mile for each 20 feet of saturated thickness. This reservoir of water can be used as a backing in seasonal dry periods and in time of drought, when ground-water recharge is insufficient to supply water to wells and maintain stream-flow.

Bedrock wells generally yield less than 10 or 15 gpm (gallons per minute) in most of the lower Merrimack River valley, but there is a unique area in Salem, Pelham, and Atkinson where bedrock wells locally and perhaps generally yield more than 40 gpm and reportedly as much as 150 gpm (well Salem 46, at Rockingham Race Track in Salem). This area appears to be relatively narrow, extending southwestward through Pelham and northeastward through Atkinson, parallel to the major faults and regional bedrock structure. The source of water probably is a fault zone in the bedrock, but determination of the extent and nature of the feature and its overall sustainable productivity would require further study.



GROUND-WATER RESOURCES OF THE LOWER MERRIMACK RIVER VALLEY, SOUTH-CENTRAL NEW HAMPSHIRE

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